

WHAT IS CLAIMED IS:

1. A substantially linear olefin polymer characterized as having:

- a) a melt flow ratio, I_{10}/I_2 , ≥ 5.63 ,
- b) a molecular weight distribution, M_w/M_n ,

5 defined by the equation:

$$M_w/M_n \leq (I_{10}/I_2) - 4.63, \text{ and}$$

c) a critical shear stress at onset of gross melt fracture of greater than about 4×10^6 dyne/cm².

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2. The polymer of Claim 1 wherein the M_w/M_n is less than about 3.5.

15 3. The polymer of Claim 1 wherein the M_w/M_n is from about 1.5 to about 2.5.

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4. The polymer of Claim 1 wherein the polymer is a substantially linear ethylene polymer having from about 0.01 to about 3 long chain branches/1000 carbons along the polymer backbone.

25 5. The polymer of Claim 4 wherein the ethylene polymer is an ethylene homopolymer.

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6. The polymer of Claim 4 having at least about 0.1 long chain branches/1000 carbons along the polymer backbone.

5 7. The polymer of Claim 4 having at least about 0.3 long chain branches/1000 carbons along the polymer backbone.

10 8. A composition comprising a substantially linear olefin polymer, wherein the polymer is characterized as having:

a) a melt flow ratio, I_{10}/I_2 , ≥ 5.63 ,
b) a molecular weight distribution, M_w/M_n ,

defined by the equation:

$$M_w/M_n \leq (I_{10}/I_2) - 5.63, \text{ and}$$

15 c) a critical shear stress at onset of gross melt fracture of greater than about 4×10^6 dyne/cm², and at least one other natural or synthetic polymer.

20 9. The composition of Claim 8 wherein the substantially linear olefin polymer has a I_{10}/I_2 up to about 20.

25 10. The composition of Claim 8 wherein the substantially linear olefin polymer has a M_w/M_n less than about 3.5.

30 11. The composition of Claim 8 wherein the substantially linear olefin polymer has a M_w/M_n from about 1.5 to about 2.5.

12. The composition of Claim 8 wherein the substantially linear olefin polymer is an ethylene polymer.

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13. The composition of Claim 12 wherein the synthetic polymer is a conventional olefin polymer.

5 14. A continuous process of preparing a substantially linear ethylene polymer having a melt flow ratio, I_{10}/I_2 , ≥ 5.63 , and a molecular weight distribution, M_w/M_n , defined by the equation:

10 $M_w/M_n \cong (I_{10}/I_2) - 4.63$, said process comprising continuously contacting one or more C₂-C₂₀ olefins with a catalyst composition under polymerization conditions, wherein said catalyst composition comprises:

15 a) a metal coordination complex comprising a metal atom of groups 3-10 or the Lanthanide series of the Periodic Table of the Elements and a delocalized π -bonded moiety substituted with a constrain inducing moiety.

20 said complex having a constrained geometry about the metal atom such that the angle at the metal atom between the centroid of the delocalized, substituted π -bonded moiety and the center of at least one remaining substituent is less than such angle in a similar complex containing a similar π -bonded moiety lacking in such constrain-inducing substituent,

25 and provided further that for such complexes comprising more than one delocalized, substituted n-bonded moiety, only one thereof for each metal atom of the complex is a cyclic, delocalized, substituted n-bonded moiety, and

b) an activating cocatalyst.

15. The process of Claim 14 wherein the process is selected from the group consisting of a gas phase

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process, a suspension process, a solution process and a slurry process.

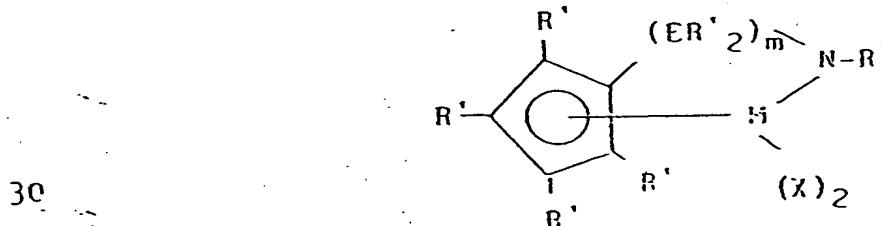
5 16. The solution process of Claim 15 wherein the polymerization conditions comprise a reaction temperature and olefin concentration sufficient to form the substantially linear olefin polymer.

10 17. The process of Claim 16 wherein the polymerization conditions comprise a reaction temperature and olefin concentration sufficient to form a substantially linear olefin polymer having a I_{10}/I_2 of at least about 8.

15 18. The process of Claim 16 wherein the polymerization conditions comprise a reaction temperature and an olefin concentration sufficient to form the substantially linear olefin polymer, wherein the polymer has a I_{10}/I_2 of at least about 9.

20 19. The process of Claim 14 wherein (a) is an amidosilane- or amidoalkanediyl- compound corresponding to the formula:

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wherein:

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M is titanium, zirconium or hafnium, bound to an η^5 -cyclopentadienyl group;

R' each occurrence is independently selected from hydrogen, silyl, alkyl, aryl and combinations thereof having up to 10 carbon or silicon atoms;

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E is silicon or carbon;

X independently each occurrence is hydride, alkyl, or aryl of up to 20 carbons; and

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m is 1 or 2.

20. The process of Claim 14 wherein (b) is methylalumoxane or tris(pentafluorophenyl)borane.

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21. The process of Claim 14 wherein ethylene is copolymerized with 1-octene.

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22. The substantially linear olefin polymer produced by the process of Claim 14.

23. A substantially linear olefin polymer characterized as having:

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a) a melt flow ratio, I_{10}/I_2 , ≥ 5.63 ,
b) a molecular weight distribution, M_w/M_n , of from about 1.5 to about 2.5.

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24. The polymer of Claim 23 wherein the I_{10}/I_2 is at least about 8.

25. The polymer of Claim 23 wherein the I_{10}/I_2 is at least about 9.

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26. The polymer of Claim 23 wherein the substantially linear olefin polymer is an ethylene/alpha-olefin copolymer.

27. The polymer of Claim 23 wherein the substantially linear olefin polymer is an ethylene homopolymer.

28. A substantially linear olefin polymer having:

10 (a) from about 0.01 to about 3 long chain
branches/1000 carbons along the polymer backbone and
(b) a critical shear stress at onset of gross
melt fracture of greater than about 4×10^6 dyne/cm²

15 29. The polymer of Claim 28 having at least
about 0.1 long chain branches/1000 carbons along the
polymer backbone.

20 30. The polymer of Claim 28 having at least
about 0.3 long chain branches/1000 carbons along the
polymer backbone.

31. The polymer of Claim 28 wherein the polymer
25 has a I_{10}/I_2 of at least about 16.

32. The of Claim 28 wherein the substantially linear olefin polymer is an ethylene/alpha-olefin copolymer.

30. 33. The polymer of Claim 28 wherein the substantially linear olefin polymer is an ethylene homopolymer.

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34. A fabricated article made from a substantially linear olefin polymer, wherein the substantially linear olefin polymer is characterized as having

- a) a melt flow ratio, I_{10}/I_2 , ≥ 5.63 ,
- b) a molecular weight distribution, M_w/M_n ,

defined by the equation:

$$M_w/M_n \leq (I_{10}/I_2) - 4.63, \text{ and}$$

c) a critical shear stress at onset of gross melt fracture of greater than about 4×10^6 dyne/cm².

35. The fabricated article of Claim 34 selected from the group consisting of film, fibers, sheets, woven fabrics, nonwoven fabrics, molded articles, wire and cable coatings.

36. The fabricated article of Claim 35 wherein the film is a blown film.

37. The blown film of Claim 36 wherein the olefin polymer is an ethylene/alpha-olefin copolymer having a density from about 0.9 g/cc to about 0.92 g/cc.

38. The blown film of Claim 37 wherein the ethylene/alpha-olefin copolymer has a molecular weight distribution, M_w/M_n , of from about 1.5 to about 2.5.

39. The blown film of Claim 37 wherein the film has a heat seal strength equal to or higher than a film made from a heterogeneous Ziegler polymerized polymer at the same heat seal temperature, wherein the substantially linear ethylene polymer and the heterogeneous Ziegler polymerized polymer have about the same melt index and about the same density.

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40. A method of increasing extruder throughput of an olefin polymer, comprising extruding a substantially linear olefin polymer having

a) a melt flow ratio, I_{10}/I_2 , ≥ 5.63 ,

b) a molecular weight distribution, M_w/M_n ,

5 defined by the equation:

$M_w/M_n \leq (I_{10}/I_2) - 4.63$, and

c) a critical shear stress at onset of gross melt fracture of greater than about 4×10^6 dyne/cm² 10 through an extruder at a temperature sufficient to melt the polymer and at an extruder pressure sufficient to convey the polymer through the extruder.

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